REMARKS/ARGUMENTS

Claims 1-10 and 12-23 are all the claims currently pending in the application. Based on the following remarks, Applicant requests reconsideration of the application and allowance of the claims.

I. Rejection of Claims 1-10, 16-17, and 21-23 Under 35 U.S.C. § 103

The Examiner rejected claims 1-10, 16-17, and 21-23 under 35 U.S.C. § 103(a) as being unpatentable over Mantravadi et al. (U.S. Patent Publication No. 2005/0068918) in view of Kadous (U.S. Patent No. 6,636,568).

Claim 1, requires, *inter alia*, a communication system having "a first mapper ... for mapping the first representations of the first portion of the communication data into *first mapped values* according to a first mapping scheme" and "a second mapper ... for mapping the second representations of the communication data into *second mapped values* according to a second mapping scheme ..." wherein the first mapper *transmits the first mapped values* to a first antenna transducer among a plurality of antenna transducers and wherein the second mapper *transmits the second mapped values* to a second antenna transducer among the plurality of antenna transducers, the first and second antenna transducers *receive and* transduce *only* the first mapped values and the second mapped values, respectively, into electromagnetic form ..."

Applicant respectfully submits that the combination of Mantravadi and Kadous does not teach or suggest at least the above recitations of claim 1. In the Amendment filed August 28, 2006, it was pointed out to the Examiner that Mantravadi fails to teach or suggest "wherein the first mapper *transmits the first mapped values* to a first antenna transducer among a plurality of antenna transducers and wherein the second mapper *transmits the second mapped values* to a second antenna transducer among the plurality of antenna transducers, the first and second antenna transducers *receive and* transduce *only* the first mapped values and the second mapped values, respectively, into electromagnetic form ..." as required by claim 1. In the current Office Action, the Examiner correctly concedes that Mantravadi does not teach or suggest all of the features of claim 1. However, the Examiner relies on Kadous to make up for the deficiencies of

Mantravadi. (See pgs. 4-5 of the Office Action) Applicant respectfully disagrees and submits that the combination of Mantravadi and Kadous does not teach or suggest all of the features of claim 1.

In contrast to claim 1, Mantravadi relates to "techniques to perform hierarchical coding with multiple antennas in a wireless communication system." (See paragraph [0008] of Mantravadi) In the background section, Mantravadi explains that "[w]ith hierarchical transmissions, [i.e., codings] the broadcast data is divided into a 'base stream' and an 'enhancement stream.'" (See paragraph [0005] of Mantravadi) Mantravadi further explains that a "conventional method of implementing hierarchical coding is through the use of non-uniform modulation" in which "data for the base stream is modulated with a first modulation scheme and data for the enhancement stream is modulated with a second modulation scheme that is superimposed on the first modulation scheme." (See paragraph [0006] of Mantravadi) (emphasis added) Mantravadi further describes that hierarchical coding is typically used for a single-input single-output (SISO) system. In this regard, Mantravadi describes that it is directed to a technique to perform hierarchical coding in a MIMO system. (See paragraphs [0006] & [0007] of Mantravadi)

As pointed out in the Amendment filed August 28, 2006, in order to achieve the hierarchical coding, by using non-uniform modulation and a modulation scheme that is superimposed on another modulation scheme, in a MIMO system, Mantravadi describes that processor 420a performs spatial processing on data symbols $\{s_b\}$ for the base data stream $\{d_b\}$ "and provides two symbol substreams for the two transmit antennas" 324a, 324b. (See paragraph [0011]) (emphasis added). Mantravadi also describes that processor 420b performs spatial processing on data symbols {se} for the enhancement data stream $\{d_e\}$ "and provides two symbol substreams for the two transmit antennas" 324a, 324b. (See *id.*) (emphasis added) Mantravadi further describes that combiner 440 receives and combines the two symbol substreams for the base stream $\{s_b\}$ and the enhancement stream $\{s_e\}$ in order to obtain two transmit symbol streams $\{x_1\}$ and $\{x_2\}$ that are provided to transmitter units 322a, 322b respectively.

In contrast to Mantravadi (and claim 1), Kadous relates to techniques for determining "data rates for a number of data streams transmitted via a number of transmission channels (or

transmit antennas) in a multi-channel (e.g. MIMO) communication system." (See Abstract & Col. 2, lines 26-32 of Kadous) Kadous describes that transmitted symbol streams may experience different channel conditions and may achieve different signal to noise ratios (SNRs) for a given amount of transmit power. Kadous further describes that if the achieved SNR of each symbol stream is known at the transmitter, then the data rate, coding and modulation scheme for the corresponding data stream may be selected to maximize spectral efficiency. However, Kadous explains that for some MIMO systems, channel state information indicative of the current channel conditions is not available to the transmitter. (See Col. 9, lines 24-35 of Kadous) In this regard, Kadous explains that it is directed to techniques to provide improved performance for a MIMO system when channel state information indicative of current channel conditions is not available at a transmitter. (See Col. 9, lines 48-51 of Kadous)

In order to determine a set of data rates for multiple data streams based on limited channel state information, Kadous discloses a transmitter system 110 in a MIMO system having a data source 112 that is provided to a transmit (TX) data processor 114. The TX data processor formats, codes and interleaves the traffic data. (Col. 59-67 of Kadous) The modulation symbols for all data streams are provided to a TX MIMO processor 120, which provides N_T modulation symbol streams to N_T transmitters (TMTR) 122a through 122t. (Col. 4, lines 11-22 of Kadous) Kadous further explains that the N_T modulated signals are transmitted from transmitters 122a through 122t and are subsequently transmitted from N_T antennas 124a through 124t and received by a receiver system 150. An RX MIMO/data processor 160 of the receiver system receives and processes the received symbol streams based on a receiver processing technique to provide N_T detected symbol streams. (Col. 4, lines 24-35 of Kadous) Kadous explains that the RX MIMO/data processor 160 may derive an estimate of the operating SNR for the system which indicates the conditions of the communication link and a controller 170 provides channel state information (CSI) to a TX data processor 178, which sends the CSI back to the transmitter system 110. (Col. 4, lines 45-64 of Kadous) At the transmitter system 110, a RX data processor recovers the CSI and a controller 130 uses the CSI to determine the data rates used for the data streams. (See Col. 4, lines 65-67 to Col. 5, lines 1-6 & FIG. 1 of Kadous)

Given that the TX data processor 310 and the TX spatial processor 320 of the MIMO system of Mantravadi are specifically designed in order to achieve hierarchical coding, by using

non-uniform modulation and a modulation scheme that is superimposed on another modulation scheme, (e.g., TX spatial processor 320 provides transmit symbol stream $\{x_1\}$ to antenna 324a which contains both data symbols for base stream $\{s_b\}$ and data symbols for enhancement stream $\{s_e\}$) (Likewise, TX spatial processor 320 provides transmit symbol stream $\{x_2\}$ to antenna 324b which contains both data symbols for base stream $\{s_b\}$ and data symbols for enhancement stream $\{s_e\}$) and since the TX data processor 114 and the TX MIMO processor 120 of Kadous are not designed for and do not achieve hierarchical coding, Applicant submits that there is no expressed or implied teaching in either reference that suggests "modify[ing] the MIMO system of Mantravadi with the MIMO architecture of Kadous" in the manner suggested by the Examiner."[1] (See MPEP § 2143.01) The Examiner has simply not provided motivation known in the art to modify the references in the manner suggested. The only teaching comes from Applicant's own disclosure, which constitutes impermissible hindsight reconstruction according to *In re Vaeck*, 20 USPQ2d 1438, 1442 (Fed. Cir. 1991)

Additionally, a skilled artisan would not (and could not) modify the MIMO system of Mantravadi with the MIMO architecture of Kadous, as suggested by the Examiner. Even assuming *arguendo* that the cited portions of Kadous disclose a first mapper that transmits first mapped values to a first antenna transducer and a second mapper that transmits second mapped values to a second antenna transducer, where the first and second antenna transducers receive and transduce only the first mapped values and the second mapped values respectively, as claimed, the combination still does not teach or suggest the features of claim 1. As explained above, the TX data processor 310 and the TX spatial processor 320 of the MIMO system of Mantravadi are specifically designed in order to achieve hierarchical coding, by using non-uniform modulation and a modulation scheme that is superimposed on another modulation scheme. However, the TX data processor 114 and the TX MIMO processor 120 of Kadous which provide data stream to transmit antennas 124a through 124t are not designed for hierarchical coding. (See the discussion of the transmitter system of Kadous at Col. 15, lines 55 to Col. 16, lines 1-67; Col. 17, lines 1-15 & FIG. 5 of Kadous) In particular, as can be seen in FIG. 5 of Kadous the TX MIMO processor 120a of Kadous simply receives a "respective

[1] See pg. 5 of the Office Action.

modulated symbol" stream (via inverse Fourier Transform (IFFT) unit 522a) from symbol mapping 516a and "respective modulated symbol stream" from symbol mapping 516t (via IFFT unit 522t). (See Col. 16, lines 53-58 of Kadous) As understood to those skilled in the art, the IFFT units 522a, 522t of Kadous do not utilize a data stream of a modulation scheme that is superimposed on another data stream of modulation scheme so as to be capable of performing hierarchal coding. (See FIG. 5 of Kadous) Rather, each "IFFT unit 522 groups sets" of "modulation symbols to form" modulation symbol vectors and thereby generate OFDM symbols which are provided to a cyclic prefix generator 524 which "then provides a stream of transmission symbols to an associated transmitter 122." (See Col. 16, lines 59-67 & Col. 17, lines 5-7 of Kadous)

Based on the foregoing, neither the cited portion nor any other portion of Kadous teaches or suggests that the transmitter system 110 of Kadous is capable of performing hierarchical coding and, as such a skilled artisan would not modify the MIMO systems of Mantravadi and Kadous in the manner suggested by the Examiner. To do so would change the principle of operation of Mantravadi and there is simply no reasonable expectation that the references can be successfully modified in the manner suggested by the Examiner. (See MPEP §§ 2143.01, 2143.02) For at least the foregoing reasons, the proposed modification is deficient and the combination does not teach or suggest all of the features of claim 1. Applicant therefore respectfully requests the Examiner to reconsider and withdraw the § 103(a) rejection of claim 1 and its dependent claims 2-10 and 12-15.

Since claims 16 and 21 contain features that are analogous to, though not necessarily coextensive with, the features recited in claim 1, Applicant submits that claims 16 and 21 as well as their respective dependent claims 17-20 and 22-23 are patentable at least for reasons analogous to those submitted for claim 1.

With further regard to claim 5, Applicant submits that claim 5 recites independently patentable subject matter given that the combination of Mantravadi and Kadous fails to teach or suggest "the first mapped values into which said first mapper maps the first representations of the first portion of the communication data comprise a first set of mapped values, wherein the second mapped values into which said second mapper maps the second representations of the second portion of the communication data comprise a second set of mapped values, elements of

the first set of mapped *values differing in value* with elements of the second set of mapped values," "the first set of mapped values and the second set of mapped values formed by said first mapper and said second mapper, respectively, are formed of *mutually-exclusive elements*," as required by claim 5 in combination with other recitations of the claims. In rejecting claim 5, the Examiner suggests that paragraphs [0105] and [0106] of Mantravadi in combination with Kadous teaches the features of claim 5. (See pgs. 6-7 of the Office Action) Applicant respectfully disagrees. Even assuming *arguendo* that the modulators 416a and 416b "can use a plurality of modulation/mapping schemes" and even if it were assumed in this case that the "modulator (416a) can use a modulation/mapping scheme that differs from the modulation/mapping scheme of modulator (416b)," as suggested by the Examiner, the combination still does not teach or suggest all of the features of claim 5. (See *id.*) Nowhere in the cited portion or any other portion of the combination is there any mention, teaching or suggestion relating to a first mapper (alleged modulator 416a) that maps a first set of mapped values and a second mapper (alleged modulator 416b) that maps a second set of mapped values where values of the first set of mapped values and the second set of mapped values *differ and are formed of mutually exclusive elements*, as claimed. The cited portion (as well as all portions) of the combination are simply altogether silent regarding the makeup and content of any of the values generated from the modulators 416a, 416b and Applicant submits that it certainly is not necessarily the case that the modulators 416a, 416b generate values that differ and that are mutually exclusive to each other, as required by claim 5 (and as known to those skilled in the art).

Based on at least the foregoing, Applicant respectfully requests the Examiner to reconsider and withdraw the § 103 rejection of claim 5 for this additional reason.

II. Rejection of Claims 12-15 & 18-20 Under 35 U.S.C. § 103

The Examiner rejected claims 12-15 and 18-20 under 35 U.S.C. § 103(a) as being unpatentable over Mantravadi in view of Kadous and further in view of Ketchum (U.S. Patent No. 6,731,668; hereinafter "Ketchum"). Applicant respectfully traverses this rejection for at least the following reasons.

As discussed above, the combination of Mantravadi and Kadous is deficient vis-à-vis independent claims 1 and 16, and Ketchum does not make up for the deficiencies of the

combination of Mantravadi and Kadous. As such, claims 12-15 and 18-20 are patentable at least by virtue of their respective dependencies from claims 1 and 16. Applicant therefore respectfully requests the Examiner to reconsider and withdraw the § 103(a) rejection of dependent claims 12-15 and 18-20.

III. Conclusion

In view of the foregoing remarks, Applicant respectfully submits that all of the claims of the present application are in condition for allowance. It is respectfully requested that a Notice of Allowance be issued in due course. Examiner Dean is encouraged to contact Applicant's undersigned attorney to resolve any remaining issues in order to expedite examination of the present application.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,

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